

for its justification. The author, aware of this rule of prejudice, but encouraged by distinguished exceptions, adopts the plan of "pegging away." These volumes are the records of a scheme of higher education by correspondence. Questions directed to the elucidation of typical problems arising in the ordinary routine of the mill are set and distributed through the medium of the technical Press amongst the workers, who are invited to transmit their solutions of the problems to be criticised and corrected. A further object is to assist the workers in preparing for the more formal examination test of the City and Guilds Institute. At the same time, the questions propounded are judiciously chosen outside the formal or text-book range of the examinations syllabus of that excellent institution. We give a selection of subjects dealt with:—*Beating*, with sections on the size and speed of beater rolls, the efficiency of refining engines and edge runners; *Sizing, Colouring and Loading*, with special problems; the *Paper Machine*, with sectional treatment of dandy rolls, wire and suction boxes; the *Qualities of Papers* in relation to use, involving practical problems in "bulk," transparency, tenacity and stretch, special printing surfaces and the like.

The chapters follow one another without any attempt at a logical sequence, and each chapter comprises a selection of students' answers, also without any attempt at classification. The author's critical remarks alternate with the matter in inverted commas, and these criticisms are quite as unequal as his students' efforts. The reader is consequently confronted on each page with a species of pictorial puzzle, with the accompanying challenge to "find the policeman."

We say "policeman" taking the accepted symbol of law and order, and the student of technology is of course seeking instruction in these fundamental regulating factors of industrial processes. This defect of form, or want of form, necessarily limits the usefulness of these volumes. As a "causerie" on mill practice they will be found interesting and suggestive, but as a guide to technological instruction the matter should have been much more carefully ordered and edited. An important function of the teacher is to teach his subjects on positive, didactic lines, and the author abdicates this position in not prefacing each chapter with his own model answer to the questions propounded.

These "Chapters on Paper-making" notwithstanding constitute a most useful appeal to the latent intelligence of our mill workers.

Paper-mills are often so situated as to cut them off from tuition classes, and, further, it must not be forgotten that most workers are on night-shifts in alternate weeks, and this is a serious impediment to instruction by classes or lectures.

The author's educational work is therefore particularly deserving of encouragement, and with a little more conviction on his own part as to its solid value, he will probably see fit so to improve the form and style of subsequent "chapters" as more efficiently to supplement and complement the work of the technological institutions.

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LOCAL ORNITHOLOGY.

- (1) *Bird-Life of the Borders, on Moorland and Sea, with Faunal Notes extending over Forty Years.* By Abel Chapman. Pp. xii+458; map and illustrations. (London: Gurney and Jackson, 1907.) Price 14s. net.
- (2) *The Birds of Kent.* By William J. Davis. Pp. vi+304; plate and map. (Dartford: J. and W. Davis, 1907.) Price 6s. net.
- (3) *Notes on the Birds of Rutland.* By C. Reginald Haines. Pp. xlvi+175; 8 plates and map. (London: R. H. Porter, 1907.) Price 7s. 6d. net.
- (1) IN preparing the second edition of his pleasant and valuable account of the birds of the borders, Mr. Chapman has practically re-written on a broader basis the first section of the book, i.e. that relating to the Cheviots and the moorlands of the borders. The second part, which treats of the north-eastern sea-board, and, to some extent, may be considered as a treatise on the wild-fowling to be had on that coast, as well as an account of the wild-fowl to be met with there, has been merely revised.

The borderland stretching from Cheviot to the Solway comprises an area of hundreds of square miles of mountain and moor. The author defines the region covered by his observations as that mountain land which remains as it was created, unaltered by the hand of man, bounded by the line where the shepherd's crook supplants the plough; where heather and bracken, whinstone and black-faced sheep repel corn and cultivation; where grouse and blackcock yet retain their ancient domain, excluding partridge and pheasant; and where the ring-ouzel dispossesses the blackbird.

"A region largely of peat as distinguished from soil, of flowe, moss, and crag; of tumbling burns and lonely moorland, glorious in all its primeval beauty."

As on the higher fell-ranges of the borders it takes two to four acres to support each sheep; the hill country is very thinly inhabited. In this edition the author has slightly extended his purview so as to include the subjacent country, namely, the foothills which slope downwards from the higher range, "and which zone might perhaps be termed the sub-alpine region." This is the fringe of the moorland, yet it lies beyond the range of the plough, and its faunal character may be exemplified by the substitution of the blackcock, peewit, and whinchat for the red grouse, golden plover, and wheat-eat of the higher land. Here we come within the outer limit of many of the lowland woodland forms.

Beginning with the earlier months, the bird-life of the moorlands is traced in a succession of chapters throughout the year. The author having had forty years' experience of the district to which he is devotedly attached, and the book being preeminently one of personal observations, and of statements of facts, as seen by him, supplemented and expanded to some extent by theories which he felt justified in founding upon these observations, it follows that in these articles we have a very complete account of the avifauna of a district which is little known and visited.

The bird-life of the borders is constantly changing throughout the year, save, perhaps, just during the heart of the breeding season; and among all the 200 species of birds which may roughly be estimated to form its feathered population, the author finds that only fourteen are absolutely stationary.

Interspersed among the regular sequence of the chapters detailing the bird-life at different seasons, we have accounts of the game-fish, migration, grouse-shooting, and grouse-disease; and a chapter of specific bird studies dealing chiefly with some of the rarer birds met with in, or which have recently extended their range to, the district. Among the many bits of stray information there are some very pertinent remarks on the important question of heather burning and the effect upon heather of black-faced sheep, which manage, when forced by sheer necessity, to retain life in them by grubbing down into its roots.

The chapter on the process of migration advances some rather novel ideas. The author suggests, in the first place, that no one has ever seen the process of migration in actual operation, and that migratory birds seen at lightships, &c., are not in the process of migration, but at its termination, making good their landfall; and further, that the few birds one sees at sea are merely waifs and strays. He disbelieves that the journeys which small birds of little wing-power perform are accomplished in the way that is ordinarily accepted, *i.e.* by hard, straightaway flying. He says that birds can reach, high in the air, regions and conditions quite beyond human knowledge; can sustain life in rarefied atmospheres where mammals could not; and may there be able to rest without exertion, or find meteorological or atmospheric forces that mitigate or abolish the labours of ordinary flight, or possibly assist its progress. All this is very suggestive, and facts are brought forward in support of these views; but much of it must remain conjectural, of course, and extreme cold, and the stormy conditions supposed to prevail at high altitudes, would, we think, have to be considered.

In the latter part of the book the wild-fowl of the north-eastern coast, their haunts and habits, and the way to get at them with a big gun, are fully dealt with; but, unfortunately, the impracticable or inaccessible nature of their chosen haunts has left inquirers much in the dark as regards the specific distribution of the grey geese on those shores. As an account of the local habits and distribution of the border birds, this book is chiefly valuable—for the habits and the nature of the haunts of birds differ in different districts. To give one instance of this, speaking (and doubtless drawing on his observations of the bird somewhere or other) of the black-tailed godwit as a former breeding species in Britain, the author says of this country, "Nowadays there are no fens; consequently no godwits." But this is not a necessary consequence. On the Continent, this godwit is known to breed in good drained grass marshes, and its nest has been found in a dry, sandy bean-field in reclaimed lands.

The author holds strong opinions, and perhaps some of his conclusions will not be universally accepted;

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possibly all the less so from his criticism of others, and a slight reluctance to accept the observations of some others as facts when they clash with his pre-conceived notions; and his distrust of what has not been seen by himself. But we have no more readable bird-book on our shelves, and the new edition will be welcome to those who have for years been unable to obtain the original one. Some of the author's drawings and pen-and-ink sketches are very pleasing and life-like. But with regard to the plate (not by the author) supposed to represent a coot and two Slavonian grebes in full winter dress at midsummer, we should certainly say that the heads of the grebes as drawn—the shape and size of the beak, and the white passing over and behind the eye—resemble more closely those of crested grebes in winter plumage. There is a map of the district, and a good index.

(2) Mr. Davis points out that hitherto no book dealing with the birds of the entire county of Kent has been published, although the works of Messrs. Dowker on east Kent, Prentis on the Rainham district, and the present author on Dartford and the north-west, have paved the way for a complete county avifauna. The information to be derived from these sources has now been brought together and supplemented by various records in the periodicals and notes which have been furnished by observers in various parts of the county. A short description of the eggs and nests has been given in most cases, and something about the habits of the birds which are resident in or regular visitors to the county. Unfortunately, the author's personal experience relates only to portions of the county, and the information respecting many of the birds can hardly be said to have been brought down to date.

Kent has given a name to no less than three birds on the British list, and we naturally turn to them in expectation of finding a full account of their history and present status in the county. It is therefore disappointing to find that the account of the Kentish plover consists of little more than a reprint of Mr. Farrer's article in *Country Life* (most excellent in itself) on the breeding habits of this little plover; while of the Sandwich tern, discovered at the place of that name in 1784, we are merely informed that "no doubt they still breed on the Kentish coast." As to the Dartford warbler, a perusal of the four and a half pages devoted to this species, "probably more interesting to the inhabitants of the town of Dartford than any other bird," leaves us in doubt whether it is still an inhabitant of Kent or not. Half a page is filled with a quotation as to the discovery of a nest and eggs of this bird in Yorkshire; but this might well have been omitted, since the Yorkshire authorities consider the record is open to the gravest doubt, and refuse to enrol the Dartford warbler on the Yorkshire list.

We can only consider this little book as a further instalment towards the adequate avifauna of Kent which we still await. Iceland, where the chough is said to breed, must be a misprint for Ireland. The appendix includes a useful list of birds observed in east Kent during the past twenty years by Mr. H. S. D. Byron, received by the author too late for

incorporation in the text. A full index and a large map make reference to the species and localities easy.

(3) One by one the English counties are getting their bird-books, and the latest to acquire this distinction is Rutland, by far the smallest of them all. Pre-eminently an agricultural county, its natural features present nothing striking, and do not show any great diversity. Of its 100,000 acres, permanent pasture absorbs more than half; not a hundred acres are waste land or heath, and not 200 acres are water. But Mr. Haines is surely far below the mark when he states that there are scarcely 400 acres of woodland. In these circumstances he has done well in being able to give so large a list as 200 of birds which have occurred in this fruitful and profitable little bit of land. Besides the natural disabilities of Rutland as a bird resort, the historian of its ornithology has to contend with a further drawback in the almost total lack of notes bearing on the subject which date back more than a hundred years.

The one exception is to be found in the notes by Thomas Barker, of Lyndon Hall, Gilbert White's brother-in-law, and two of the earliest of these are initialed by the historian of Selborne. But the notes do not amount to much, and refer chiefly to the arrival and departure, and the opening of song of less than a score of species. The most interesting of them is the wood-lark—a very rare bird now in Rutland. A slip is made in describing the gentleman who brought these notes to light as a *descendant* of Gilbert White! The later printed authorities are very few, and although a work published in 1889 is entitled "The Vertebrates of Leicestershire and Rutland," the Rutland birds are very inadequately treated therein. So that there was quite room for a new and complete work on the subject, in the preparation of which the present author has had the assistance of a large number of observers.

The general condition and character of the avifauna of the county is treated in a lucid and interesting manner in the concluding portion of the introduction, and lists are given of the species which have increased or decreased in recent years. Lists, too, are given of the resident species which are subject to some migration, and of the whole of the species actually enumerated as Rutland birds, showing their status in the county. The references made to the habits and life-histories of birds in the body of the work have been drawn from observations made in Rutland itself. The facts of most importance for British ornithologists in general to be gleaned from the pages of this handy little volume are: the eighth instance of the occurrence of Bonaparte's gull; the unique nesting of the bee-eater; the addition of Rutland to the counties where the pied flycatcher has been seen; the recent appearance of the bearded tit in the county; the acquisition of the redshank as a nesting species; the very early return of the wryneck; and the early nesting of the corncrake and partridge. The author himself seems to feel a little doubtful about the identification of the Bonaparte's gull, and ornithologists in general will be still more so; while as for the nesting of the bee-eater, we cannot help thinking that some mistake or

confusion of specimens occurred; the confusion in which the authority for the record seemed to be about the smaller grebes (p. 163) inclines us more strongly to this view.

The plates are pleasing, though they have not all of them much to do with Rutland especially. But there is one which will puzzle most people. As the jack snipe, the principal figure in it, is cut all to pieces by the shot which has apparently been fired, and is obviously dead in the air, we cannot see why the picture should be called "A Narrow Escape"; unless the title refers to the dog, which does not appear to have been hit! We have, however, seen a plate in another book which has a striking resemblance to this one, but there it has another and more appropriate title. A good index and a map complete this nicely got up little volume.

ELECTRICAL ENGINEERING.

- (1) *A Text-book of Electrical Engineering.* By Dr. Adolf Thomälen; translated from the German by G. W. O. Howe. Pp. viii+456. (London: Edward Arnold, 1907.) Price 15s. net.
- (2) *The Elements of Electrical Engineering.* By Profs. W. S. Franklin and Wm. Esty. Vol. i. Direct-Current Machines, Electric Distribution and Lighting. Pp. xiii+517. (New York: The Macmillan Company; London: Macmillan and Co., Ltd., 1906.) Price 18s. 6d. net.
- (1) **THIS** book is an English translation of the second edition of the "Kurze Lehrbuch der Elektrotechnik," and includes some additional matter which will be introduced into the third edition. It is intended to meet the needs of electrical engineering students who have passed the most elementary stages and are taking a second- and third-year course at the technical colleges.

It is not easy to give a satisfactory definition of electrical engineering, but in default of a better it may be suggested that the subject should comprise the generation, distribution and utilisation of electric energy. This may be interpreted narrowly or broadly according to the judgment of the individual. If this be accepted as a reasonable definition, the book before us is by no means comprehensive enough to be justly called "a text-book of electrical engineering"; it should rather be called "an introduction to the theory of dynamo design." Distribution of electric energy is not considered at all, and its utilisation only in so far as the theories of motors, direct and alternating current, are concerned. The theories of direct-current feeders, of switchgear for controlling generators and motors, of electric traction apparatus, are not abstruse, and a knowledge of these matters is likely to be more useful to the average engineer than the theory of dynamo machinery.

Recognising, however, the limitations of the subject-matter, the book may be safely recommended for what it contains, although it is surprising that there should have been much difficulty in finding books already in existence covering the same range, as stated in the preface. As a brief indication of the